ON THE ANATOMY OF RHYSOTA FOULLIOYI.

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PLATES VII AND VIII.

THE specimen described below came from New Guinea and was kindly given to me for dissection by the Secretary of the Society, Mr. G. K. Gude, to whom I wish to tender my best thanks for the opportunity of examining it. It was in excellent condition.

External Appearance.

The snail was slightly contracted, the tentacles and fore-part of the foot being withdrawn.

The general ground colour of the body and foot is buff yellow, fairly pure upon the parts of the foot normally protected by the overhanging shell, but upon the head and tail dusky, and clouded with black, as if the snail had been dipped in ink and the superfluous ink washed off.

The sole of the foot is pure buff yellow, and is not divided into median and lateral areas.

The upper surface of the foot behind the shell is bluntly keeled. The posterior end is truncated and deeply cleft by a cruciform, or probably in the expanded state pear-shaped, mucous pore. The upper lip of the pore is slightly prominent, but does not form a definite 'horn' (fig. 1).

The edge of the foot is bordered by a double selvage or marginal band (fig. 1). The lower band is twice the breadth of the upper, and meets its fellow posteriorly above the nuccous pore. It is banded with vertical black stripes, which with fair regularity are alternately broad and narrow. The upper band originates in front, below the posterior extremity of the lateral lip, and is at first a definite though small fold overhauging the lower band. However, throughout practically the whole length of the foot, the two bands are separated only by a narrow groove. In a similar way the upper band is bounded above by a narrow groove, and is further divided by vertical grooves into a series of quadrangular areas, whose boundaries in the main correspond with the broader black lines of the lower border. Above, a series of grooves pass upwards from the margin of the upper band, and are lost towards the mid-dorsal line of the foot.

The month (fig. 7) is encircled by a beaded lip. Between the chin and the foot are a pair of thin lateral lips (fig. 7, L^2) that project forward in the horizontal plane and extend from beneath the lesser tentacle to the anterior mid-line.

The mantle border (fig. 2) is provided with strongly developed cervical lobes. Shell lobes are absent.

The right cervical lobe towards the left forms the floor of the respiratory orifice and is here produced as a free process for some



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distance beneath the right half of the left lobe. The left lobe is completely divided into two parts, the left of which is considerably produced at its right end.

The Mantle-cavity.

The kidney, pericardium, ureter, and rectum occupy the usual positions. The kidney (fig. 6) is long and narrow, more than twice as long as the pericardium. Its cardiac end is to some extent broadened out upon the pericardium. The plan of venation of the lung-sac is shown in fig. 6.

The ureter opens by a minute pore just above the anus, and a groove leads the excretion to the right to a cleft in the lower margin of the concave surface of the visceral hump, thus away from the respiratory orifice.

The Internal Organs.

Upon cutting open the body from above, the organs when slightly pushed to the right and left have the appearance shown in fig. 4.

The Alimentary Canal. Figs. 4, 4a.

The jaw was unfortunately not seen.

The buccal mass is small, oval in shape from above, concave in profile below, and without a prominent radula-sac.

The esophagus is narrow, though definitely sacculated below. It enlarges with some suddenness to form a voluminous crop, which passes without much diminution in calibre into the stomach. The stomach, shortly after receiving the bile-duct, is reflected on itself at the extreme end of the visceral hump to form the first part of the intestine, which passes forward beneath the hinder extremity of the crop, makes two loops among the liver lobes, and reaches the anus along the right side of the mantle-cavity in the usual way.

The salivary glands are united to form a thin sheet upon the dorsal surface of the crop. Their ducts enter the buccal cavity in the usual position on either side of the origin of the œsophagus.

The radula (fig. 8) consists of some 189 teeth in the transverse row (94:1:94). Both median and lateral teeth are monocuspid, those towards the margins forming simple needle-like hooks. The rows are nearly straight from side to side, with the least possible angle at the centre.

The Generative Organs. Figs. 4, 5, 5a.

The genital pore lies close below the optic tentacle. It leads into a long cylindrical and highly muscular vestibule (CL.) common to the openings of the penis and vagina. In the natural position the male organs lie to the left, the female and hermaphrodite organs to the right. The female consist of a vagina, receptaculum seminis, and oviduct; the male of a penis, epiphallus, kalk-sac, and vas deferens.

The vagina opens into the apex of the vestibule. It is a globular chamber communicating at its apex with a long thin-walled and bluntly pointed receptaculum seminis, and through an aperture in its ventral wall with the oviduct. In the natural position the receptaculum is spirally twisted at its origin, and lies closely applied to the concave surface of the hermaphrodite duct.

The penis opens into the vestibule opposite the mouth of the vagina. It is of large size, swollen in the middle, and enveloped to within a short distance of its retractor muscle by a loose sheath of muscle. At the point of attachment of its retractor muscle it is sharply bent upon itself, but cannot be said to form a cæcum. The segment between this bend and the vas deferens (epiphallus) is short, and at its distal end has a large globular and intensely white kalk-sac. The vas deferens passes forward beneath the penis, and thence in a mesentery of its own to the apex of the cloaca. At this point it is reflected around the anterior aorta and pleural nerves upon the surface of the vagina, and combines with the oviduet to form the hermaphrodite duct in the usual way.

The penis, when exposed by dividing the loose muscular sheath mentioned above, is seen to owe a large part of its swollen appearance to a double lobulated glandular development of its convex surface. The inner surface of the penis is grooved dorsally to form a seminal channel, with strongly dentate borders. The terminal dentations or papillæ are particularly pronounced, and no doubt form a papillate extremity to the organ when everted.

The retractor penis is attached to the right side of the body, close to the anterior aorta, and directly above the base of the albumen gland.

The ovotestis was destroyed.

The Retractor Muscles. Fig. 3.

The buccal retractor is completely separate from the rest, except at its actual origin from the shell. Anteriorly it divides into two slips for insertion upon the buccal mass.

The tentacular retractors of each side arise as a single strand from the pedal retractor mass. About the middle of its length the strand divides, the greater part passing to the ocular tentacle, and a smaller slip to the anterior tentacle.

Upon anatomical grounds, and leaving the shell altogether aside, one cannot include this species in the genus *Hemiplecta*, the genus to which the shell is at present referred.

The chief characters upon which this conclusion rests are the absence of shell lobes, the absence of an amatorial organ, the papillate condition of the interior of the penis, and the needle-like marginal teeth of the radula.

On the other hand, the animal in the broad lines of its structure and in many important particulars resembles the members of the Philippine genus *Rhysota*. This is the case as regards the foot and mucous pore, the condition of the mantle-lobes, the general form of the genitalia (compare particularly Semper's figure of the genitalia of *Rhysota ovum*, Reisen im Archipel., Philippinen Landmoll., p. 69, pl. iv, fig. 1), the form of the penis and receptaculum seminis, and the development of papillæ within the penis.



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An important divergence from the condition of the genitalia characteristic of the genus *Rhysota* is, however, shown in the presence upon the vas deferens of a well-developed kalk-sac. In this important particular the genitalia resemble those of Hemiplecta rather than of Rhysota.

The alimentary tract is similar to that described in the genus Rhysota, particularly in the needle-like form of the marginal teeth of the radula, in the nearly straight disposition of the two halves of each transverse row of teeth, and in the form of the buccal mass. The kidney also is not unlike the long strap-shaped kidney described for this genus.

For the above reasons it appears that this snail should be included in the genus Rhysota rather than in Hemiplecta, although the presence of a kalk-sac suggests that it has closer affinities with Hemiplecta than the hitherto known forms of Rhysota from the Philippines.

In conclusion, I wish to express my thanks to Colonel Godwin-Austen for help with the literature of the group, and for allowing me to submit my drawings to him and to profit by his experience of the anatomy of Eastern snails.

EXPLANATION OF PLATES VII AND VIII.

PLATE VII.

Anatomy of Rhysota Foullioyi.

- The hinder part of the foot, from the left. M.B.1, M.B.2, lower and upper FIG. 1.
- The mattle border. L.C.L.¹, L.C.L.² left cervical lobe, R.C.L. right cervical lobe. Rod, in respiratory orifice. The retractor muscles, from above. B.R. buccal retractor, P.R. pedal retractor, T.¹R., T.²R. retractors for the two tentacles. 2.
- 3. ,,
- General view of viscera from above. A.A. anterior aorta, AL.G. albumen gland, B.D. bile-duct, CL. genital cloaca, HM.D. hermaphrodite duct, INT. intestine, K. kidney, K.S. kalk-sac, M. mesentery of vas deferens 4. ,, P. penis, PC. pericardium, R. rectum, R.P. retractor penis, R.S. receptaculum seminis, S.G. salivary glands, ST. stomach, T.¹, T.² tentacles, U. ureter, V. vagina, V.D. vas deferens; dotted area, liver.
- 4a. Diagram of arrangement of gut coils.

PLATE VIII.

- FIG. 5. The genital organs spread out. The cloaca, vagina, and penis-sheath are opened. EP. epiphallus, O. oviduet, O.² its opening into vagina, P.Gl. glandular bodies on penis, P.S. sheath of penis; other letters as in Fig. 4.
 - 5a. The penis, opened. S.F. papillate seminal folds; other letters as in Fig. 5. ,,
 - 6. ,,
 - Inner surface of mantle. K. kidney (dotted), U. ureter. Anterior view of head. L. beaded circular lip, L.² lateral lip, M.B.¹, 7. ,, M.B.² the two marginal bands of the foot.
 - 8. The radula. A. central and admedian, B. lateral, C. marginal teeth.

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